

Chapter 5: Minerals of Earth's Crust

5.1 What is a mineral?

- A. Minerals are the basic materials of Earth's crust
- B. Minerals are inorganic substances with characteristic physical properties
- C. Four basic questions if it is a mineral
 1. Is the substance inorganic?
 2. Does the substance occur naturally?
 3. Does the substance show crystalline form in a solid?
 4. Does substance have consistent chemical properties?

II. Kind of Minerals (More than 4,000 minerals on Earth)

- A. Common-minerals = rock forming minerals
- B. Silicate Minerals - contain a combo of Si + O (96% of minerals in Earth's crust)

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C. Non-silicate minerals - 4% of Earth's crust

1. Six major groups of non-silicates: carbonates, halides, native elements, oxides, sulfates, sulfides

III Crystalline Structure - all minerals have a crystalline structure

- A. Silicate minerals are all made up of the same building blocks: Si-O tetrahedron
 1. Combine in different ways to form different silicate minerals

B. 6 kinds of silicate mineral arrangements

student
responsibility
to know
differences

1. Isolated Tetrahedron
2. Ring Silicates
3. Single-chain silicates
4. Double-chain silicates
5. Sheet silicates
6. Framework silicates

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- IV** Crystalline structure of Nonsilicate Minerals
- A. Nonsilicate minerals display a variety of crystalline structures
 1. chemical structure of nonsilicate mineral determines its characteristics
 - B. Elements have high densities due to the close packing atoms
 1. called closest packing: each atom surrounded by 8 to 12 metal atoms other metal atoms that are as close together as the atom's charges will allow

S.2 Identifying Minerals
 → Mineralogists (Earth Scientists) classify minerals based on their properties

I. Physical properties of minerals

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- A. Color is a physical property that is easy to identify for minerals
 1. However, color is unreliable for I.D. of minerals
- B. Color of a mineral powdered form is reliable (mineral streak)
 1. Luster - light reflected from minerals surface
 - a. Metallic luster - reflects light like a polished metal does
 - b. Nonmetallic luster - does not reflect light like a metal: several types
 - glassy, waxy, pearly, brilliant, dull/earthy (quartz) (mica) (diamond) (no shine)
- C. Cleavage and Fracture
 1. Minerals that tend to break along a cleavage plane
 2. Minerals that tend to break unevenly along cleavage planes (fracture)

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- a. Fractures described according to their appearance of broken surface
- rough = uneven or irregular surface
 - appearance of broken wood = splinty or fibrous fracture
 - curved break = conchoidal fracture
- D. Hardness - ability of a mineral to resist scratching
1. Moh's hardness scale set standards of comparison for mineral hardness (Table 1 p. 111)
- E. Crystal shape
1. Mineral crystal forms in one of six basic shapes
- student responsibility to know {
- a. Isometric or cubic system
 - b. Orthorhombic system
 - c. Tetragonal system
 - d. Hexagonal system
 - e. Monoclinic system
 - f. Triclinic system

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- F. Density - depends on kinds of atom that the mineral has and how close they are packed
- II Special Properties of Minerals
- A. Certain minerals exhibit unique characteristics
- 1. The ability to glow - fluorescence
 - 2. The ability to glow after UV light is turned off - phosphorescence
 - 3. Displaying a silky appearance - chatoyancy
 - a. also called cats-eye-effect
 - b. result of closely packed parallel fibers
 - 4. Asterism - a mineral displays a six-sided star shape in light

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